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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/911,784	07/24/2001	Masaharu Yoshiyama	1503.65719	3902

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EXAMINER	
PHAM, KHANH B	

ART UNIT	PAPER NUMBER
2177	6

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/911,784	YOSHIYAMA ET AL.	
	Examiner	Art Unit	
	Khanh B. Pham	2177	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. **Claims 1, 4, 10, 13 and 16 are rejected under 35 U.S.C. 102(e)** as being anticipated by Chaudhuri et al. (US 6,223,171 B1), hereinafter "**Chaudhuri '171**".

As per claims 1, 10,13, and 16, Chaudhuri '171 teaches a database retrieving method, computer readable medium and apparatus for performing method comprising:

- "making a comparison between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated and a cost required when entire retrieval is performed" at Col. 23 lines 53-67 and Fig. 15;
- "generating an index corresponding to the retrieval condition if the cost required when the entire retrieval is performed is higher as a result of the cost comparison" at Col. 24 lines 4-6;

- "and retrieving a database by using the generated index" at Col. 1 lines 20-35.

As per claim 4, Chaudhuri '171 teaches the database retrieving method according to claim 1 as discussed above. Chaudhuri also teaches: "managing data of the number of accesses, a generation date and time, and an update frequency of the generated index" at Figs. 8-13; and "deleting the generated index according to management status of the data" at Col. 16 lines 35-45.

3. **Claims 1, 10, 13 and 16 are rejected under 35 U.S.C. 102(e)** as being anticipated by Tenorio et al. (US 2002/00830048 A1), hereinafter "**Tenorio**".

As per claims 1, 10,13, and 16, Tenorio teaches a database retrieving method, comprising:

- "making a comparison between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated and a cost required when entire retrieval is performed" at page 1, [0006];

- "generating an index corresponding to the retrieval condition if the cost required when the entire retrieval is performed is higher as a result of the cost comparison, and retrieving a database by using the generated index" at page 1, [0006].

4. Claims **1-2, 4-7,10-11,13-14 and 16** rejected under 35 U.S.C. 102(b) as being anticipated by Smith et al. (US 5,404,510 A), hereinafter "Smith".

As per claim 1, 10, 13 and 16, Smith teaches a method, computer readable medium, and apparatus for performing method comprising:

- "making a comparison between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated and a cost required when entire retrieval is performed" at Col. 10 lines 60-67;

- "generating an index corresponding to the retrieval condition if the cost required when the entire retrieval is performed is higher as a result of the cost comparison and retrieving a database by using the generated index" at Col. 12 line 65 to Col. 13 line 5;

As per claim 2, Smith teaches a database retrieving method, comprising:

- "making a comparison between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated and a cost required when entire retrieval is performed" at Col. 10 lines 60-67;

- "determining whether or not a first index which satisfies a condition wider than the retrieval condition exists among already generated indexes, if the cost required when the entire retrieval is performed is higher as a result of the cost comparison" at Col. 12 lines 32-65;

- "generating a second index which satisfies only the retrieval condition by using the first index, if the first index which satisfies the wider condition exists; and retrieving a database by using the generated second index" at Col. 12 lines 32-65.

As per claim 4, Smith teaches the database retrieving method according to claim 1 as discussed above. Smith also teaches: "managing data of the number of accesses, a generation date and time, and an update frequency of the generated index, and deleting the generated index according to management status of the data" at Col. 14 lines 1-25.

As per claim 5, Smith teaches the database retrieving method according to claim 1 as discussed above. Smith further teaches:

- "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a data update or deletion" at Col. 6 lines 22-33;
- "determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists" at Col. 1 lines 22-33;
- "and deleting the index prior to start of the access process, if the access performance is degraded" at Col. 6 lines 42-43.

As per claim 6, Smith teaches the database retrieving method according to claim 2 as discussed above. Smith further teaches: "managing data of the number of

accesses, a generation date and time, and an update frequency of the generated index, and deleting the generated index according to management status of the data" at Col. 14 lines 1-25.

As per claim 7, Smith teaches the database retrieving method according to claim 2 as discussed above. Smith further teaches:

- "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a date update or deletion" at Col. 6 lines 22-33;
- "determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists" at Col. 6 lines 22-33;
- "and deleting the index prior to start of the access process, if the access performance is degraded" at Col. 6 lines 42-43.

5. **Claims 3, 12 and 15 are rejected under 35 U.S.C. 102(e)** as being anticipated by Chaudhuri et al. (US 6,169,983 B1), hereinafter "**Chaudhuri '983**".

As per claims 3, 12, and 15 Chaudhuri '983 teaches a database retrieving method, comprising:

- "making a comparison between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated and a cost required when entire retrieval is performed" at Col. 13 lines 20-40;

- "determining whether or not two or more indexes which satisfy the retrieval condition by being combined exist among a plurality of already generated indexes, if the cost required when the entire retrieval is performed is higher as a result of the cost comparison" at Col. 14 lines 15-40 and 51-52;

- "generating an index corresponding to the retrieval condition by combining the two or more indexes, if the two or more indexes exist" at Col. 14 lines 53-55;

- "retrieving a database by using the generated index" at Col. 14 lines 63-67.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. **Claim 8 is rejected under 35 U.S.C. 103(a)** as being unpatentable over Chaudhuri '983 as applied to claims 3, 13 and 15 above, and in view of Chaudhuri '171.

As per claim 8, Chaudhuri '983 teaches the database retrieving method according to claim 3 as discussed above. Chaudhuri '983 does not explicitly teach: "managing data of the number of accesses, a generation date and time, and an update frequency of the generated index; and deleting the generated index according to management status of the data". However, Chaudhuri '171 teaches a similar method

including the step of: "managing data of the number of accesses, a generation date and time, and an update frequency of the generated index" at Figs. 8-13; and "deleting the generated index according to management status of the data" at Col. 16 lines 35-45. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine both Chaudhuri's teachings in order to "assist the database administrator in identifying indexes that are rarely used and that therefore may be removed" as noted by Chaudhuri '171, Col. 16 lines 40-45.

8. **Claims 9 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Chaudhuri '983 as applied to claims 3, 13, and 15 above, and in view of Smith.

As per claim 9, Chaudhuri '983 teaches the database retrieving method according to claim 3 as discussed above. Chaudhuri '983 does not explicitly teach the steps of: "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a data update or deletion; determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists; and deleting the index prior to start of the access process, if the access performance is degraded". However, Smith teaches a similar method including the step of:

- "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a date update or deletion" at Col. 6 lines 22-33;

- "determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists" at Col. 6 lines 22-33;

- "and deleting the index prior to start of the access process, if the access performance is degraded" at Col. 6 lines 42-43.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Chaudhuri '983 and Smith's teaching so that "unimportant and volatile indexes may be pruned from the system" (Smith, Col. 6 lines 40-45), and therefore improve the performance of the database by reducing the cost of maintenance these indexes.

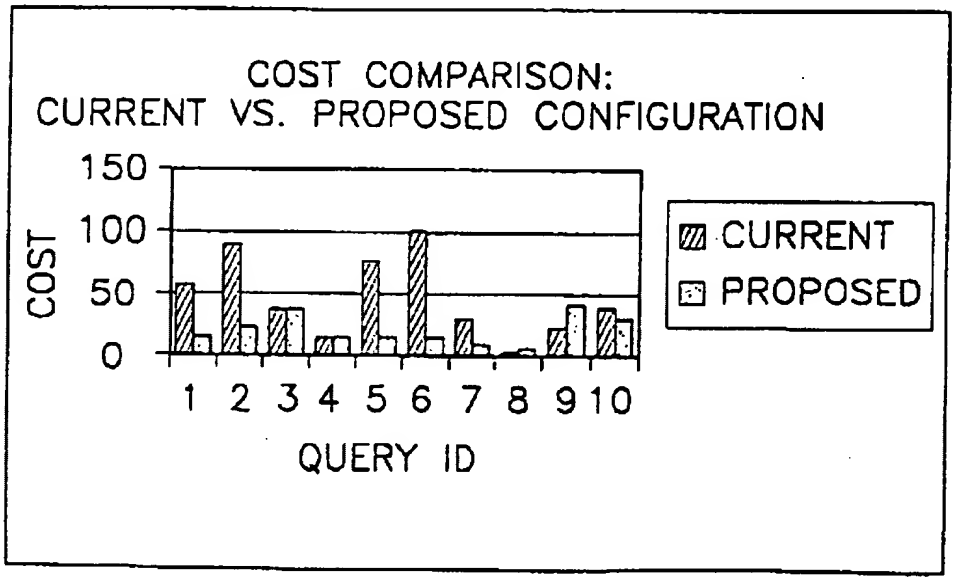
Response to Arguments

10. Applicant's arguments filed March 5, 2004 have been fully considered but they are not persuasive. The examiner respectfully traverses applicant's arguments.

Regarding claims 1, 4, 10, 13 and 16 rejection on the basis of Chaudhuri '171, Applicant argued that Chaudhuri'171 does not teach: "making a comparison between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated and a cost required when entire retrieval is performed". On the contrary, Chaudhuri'171 teaches the comparison between "Current VS. Proposed configuration", wherein the proposed configuration comprises adding indexes on columns of the database tables. For example, when executing a query in which the retrieval condition is based on column B of the table T, the proposed configuration

comprises adding the index on column B of the table T, wherein current configuration is the configuration without the index on column B (Col. 23 lines 53-67), and therefore requires entire scanning of the column B. Fig. 15 of the Chadhuri's 171 shows the comparison step, reproduced below:

Fig.15



Regarding claims 1, 10, 13 and 16 rejection on the basis of Tenorio reference, applicant argued that Tenorio does not teaches "a cost comparison based on the conditions" as claimed. On the contrary, Tenorio teaches a method for selectively indexing a database by comparing the cost of scanning database columns with and without indexes on the columns, reproduced below:

"a method for selectively indexing a database includes selecting a set of fields in the database. The selected files are located in one column of a table in the database. The method also includes **determining the total time required for reading data from the fields during a selected time period if the field**

are indexed and determining the total time required for reading data from the field during the selected time period if the field are not indexed... In addition, the method includes evaluating the total times required for reading and writing data to the fields to **determine whether the field should be indexed**" [0006].

Regarding claims 1-2, 4-7, 10-11, 13-14 and 16 rejection on the basis of Smith reference, applicant argued that Smith does not teach "making a cost comparison and adopting the lower cost approach". On the contrary, Smith teaches the comparison step at Col. 10 lines 60-67 recited below:

"Depending on the capability of the I/O subsystem in a relational database system, context on tables having cardinality below a certain threshold value may be bypass and consequently **not used as basis for index**. This is because the I/O subsystem may retrieve the whole table in a single fetch and an in-memory **sequential scan of the data may be cheaper than an indexed retrieval**"

Applicant also argued that "Smith does not describe a matching condition concerned with data, while it does describe a matching condition concerned with a column". The examiner did not see the different between "matching condition concerned with data" and "matching condition concern with a column", because a column of a database table also contains data. Smith is therefore anticipated this limitation.

Regarding claims 3, 12, and 15 rejection on the basis of Chaudhuri '983, applicant argued that Chaudhuri '983 does not teach "combining a number of exiting indexes". On the contrary, Chaudhuri '983 describes creating an index by merging two or more indexes at Col. 13 lines 20-40, and therefore anticipated this limitation.

Applicant also argued that Chaudhuri '983 does not teach "generating an index corresponding to a retrieval condition". On the contrary, Chaudhuri '983 teaches the step of generating an index by merging two or more indexes based on estimated cost to execute the queries of workload W (Col. 13 lines 20-40). The merged index is therefore corresponding to the queries of the workload, or "retrieval condition" as claimed.

In light of the foregoing arguments, the 35 U.S.C 102 and 103 rejections is hereby sustained.

Conclusion

11. The prior art made of record, listed on form PTO-892, and not relied upon, if any, is considered pertinent to applicant's disclosure.

If a reference indicated as being mailed on PTO-FORM 892 has not been enclosed in this action, please contact Lisa Craney whose telephone number is **(703) 305-9601** for faster service.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh B. Pham whose telephone number is (703) 308-7299. The examiner can normally be reached on Monday through Friday 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E Breene can be reached on (703) 305-9790. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Khanh B. Pham
Examiner
Art Unit 2177

KBP
May 4, 2004

PC
CHANNAVAJJALA
PRIMARY EXAMINER